



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/710,737 | 07/30/2004 | Kevin K. Chan | FIS920040027 | 4736 |

23389 7590 10/05/2005

SCULLY SCOTT MURPHY & PRESSER, PC
400 GARDEN CITY PLAZA
SUITE 300
GARDEN CITY, NY 11530

EXAMINER

DUONG, KHANH B

ART UNIT PAPER NUMBER

2822

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/710,737

Applicant(s)

CHAN ET AL.

Examiner

Khanh B. Duong

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37-CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-25, 27 and 28 is/are rejected.
- 7) ☒ Claim(s) 13 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>7/30/14</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the filing of the application on July 30, 2004.

Accordingly, claims 1-28 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 7-10, 14-17, 19-22, 24, 27 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Lewis et al. (U.S. 2002/0139975 A1).

Re claims 1, Lewis et al. (“Lewis”) discloses in FIGs. 5-8 [see page 9, paragraphs 0085 to 0090] a method of forming an organic passivation layer comprising: forming a monolayer (62 or 82) comprising carbon and oxygen on a first semiconductor layer (60 or 80) [see page 3, paragraphs 0036 to 0038]; and forming a second semiconductor layer (72, 84 or 92) on said mono-layer (62 or 82), wherein one of said semiconductor layers (e.g. gate 72 or 92) contains dopants therein.

Furthermore, the functional recitation that “said monolayer substantially retards diffusion of said dopants” has not been given patentable weight because it is narrative in form. In order to be given patentable weight, a functional recitation must be expressed a “means” for performing the specified function, as set forth 35 U.S.C. 112, 6th paragraph, and must be supported by recitation in the claim of sufficient structure to warrant the presence of the functional language.

In Re Fuller, 1929 C.D. 172; 388 O.G. 279.

Re claim 2, since Lewis discloses etching the silicon-containing surface with ammonium fluoride (NH_4F) aqueous solution prior to forming said monolayer [see page 4, paragraph 0039], it must be inherent that any surface native oxide [see page 1, paragraph 0005] would have been removed during this etching process.

Re claim 4, Lewis discloses said first semiconductor layer is subjected to a hydrogen termination processing step prior to forming said monolayer [see page 4, paragraph [0039].

Re claim 7, Lewis discloses said dopants of said semiconductor layers (e.g. gate 72 or 92) are inherently either n-type or p-type.

Re claims 8 and 9, Lewis discloses said dopants are located inherently in the first semiconductor layer (60 or 80), or in the second semiconductor layer (72 or 92).

Re claim 10, Lewis discloses forming said monolayer comprises contacting the first semiconductor layer with a solution comprising iodine (I_2) and an alcohol (methanol: CH_3OH) [see page 8, paragraphs 0076 to 0077].

Re claim 14, see discussion above regarding claim 10.

Re claim 15, see discussion above regarding claim 1.

Re claim 16, see discussion above regarding claim 2.

Re claim 17, see discussion above regarding claim 4.

Re claim 19, see discussion above regarding claim 7.

Re claim 20, see discussion above regarding claim 8.

Re claim 21, see discussion above regarding claim 9.

Re claim 22, see discussion above regarding claim 10.

Art Unit: 2822

Re claim 24, Lewis expressly discloses in FIGs. 6, 8, 16, 17 and 19 said overlayer comprises a semiconductor material (72 or 92), an insulator (84) or a conductor (184 or 204).

Re claim 27, see discussion above regarding claim 14.

Re claim 28, Lewis expressly discloses in FIG. 13 a first material layer 130 comprises an insulator (isolation region) 134 and the overlayer 152 comprises a conductor 152.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

Art Unit: 2822

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis.

Re claims 11 and 23, Lewis discloses said solution comprising iodine and an alcohol contains 0.05 M, instead of from about 1×10^{-5} M, of iodine in alcohol.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to optimize and select an appropriate concentration of iodine. The selection of parameters such as energy, power, concentration, temperature, time, depth, thickness, etc., would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce new and unexpected result which is different in kind and not merely degree from results of prior art ... such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In re Aller*, 105 USPQ 233, 235 (CCPA 1955). See also MPEP 2144.05.

Claims 12 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis in view of Gardner et al. (U.S. 6,160,300).

Re claims 12 and 25, Lewis fails to disclose said forming a second semiconductor layer comprises a deposition process that is performed at a temperature of about 500°C or greater.

Gardner et al. ("Gardner") suggests forming a second semiconductor layer (gate conductor) 14 comprises a deposition process that is performed at a temperature of above or below 580°C depending on whether amorphous or polycrystalline silicon is desired [see col. 6, lines 40-44].

Since Lewis and Gardner are from the same field of endeavor, the purpose disclosed by Gardner would have been recognized in the pertinent prior art of Lewis.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Lewis as suggested by Gardner because of the desirability to form either an amorphous or a polycrystalline silicon layer.

Claims 3, 5, 6 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis in view of Kawasaki et al. (U.S. Patent No. 5,605,860).

Re claims 3, 5, 6 and 18, Lewis discloses using ammonium fluoride (NH₄F) aqueous solution, instead of a hydrofluoric acid-containing solution (HF) or a hydrogen anneal, to hydrogen terminate the first semiconductor layer and inherently remove any surface native oxide.

Kawasaki et al. ("Kawasaki") suggests that HF solution, NH₄F solution and a hydrogen anneal are equivalent techniques well known in the art for performing hydrogen termination [see col. 5, lines 55-62].

Art Unit: 2822

Since Lewis and Kawasaki are from the same field of endeavor, the purpose disclosed by Kawasaki would have been recognized in the pertinent prior art of Lewis.

Therefore, because HF solution, NH_4F solution and a hydrogen anneal were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute one technique for the others.

Allowable Subject Matter

Claims 13 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Linford '708 and Saito '927 disclose relevant teachings regarding methods of inhibiting dopant diffusion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on 10:00-6:30.

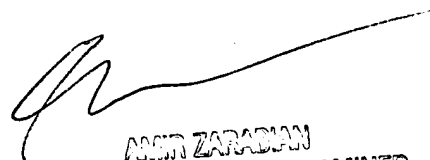
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2822

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD



AMIR ZAREKHAN
PATENT EXAMINER
ART UNIT 2822